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Indian Standard

METHOD FOR DETERMINATION OF SLAKE DURABILITY INDEX OF ROCKS

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METHOD FOR DETERMINATION OF SLAKE DURABILITY INDEX OF ROCKS

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METHOD FOR DETERMINATION OF SLAKE DURABILITY INDEX OF ROCKS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 24 December 1981, after the draft finalized by the Soil Engineering and Rock Mechanics Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 A number of Indian Standards covering method of test to assess various properties of rocks are being formulated. This standard covers the property of durability of rock which is best used for comparing one rock with another on the basis of their respective slake-durabilities.

0.3 In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This test is intended to assess the resistance offered by a rock sample to weakening and disintegration when subjected to two standard cycles of drying and wetting in a slaking fluid usually water.

NOTE — Acids, sea water or corrosive ground water could also be used.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definition shall apply.

2.1 Slaking Fluid — The fluid used in slake durability test is termed as slaking fluid. Tap water at 20°C, approximating to normal ambient temperature is specified for the test.

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*Rules for rounding off numerical values (*revised*).

3. APPARATUS — (*see* Fig. 1).

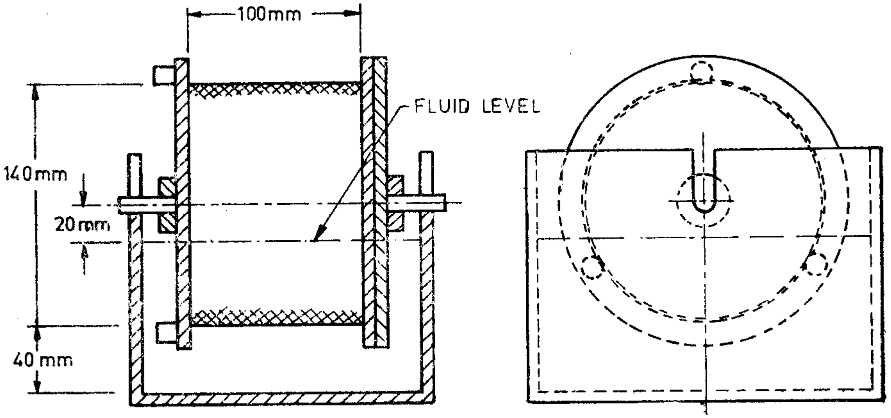

FIG. 1 LINE DIAGRAM OF SLAKE-DURABILITY TEST APPARATUS

3.1 The test drum shall be made from a 2·0 mm wire mesh of unobstructed length of 100·0 mm and diameter 140 mm with a solid fixed base. The drum shall be able to withstand a temperature of 105°C. The drum shall have solid removable lid. The drum shall be sufficiently strong to retain its shape during use, but neither the exterior of the mesh nor the interior of the drum should be obstructed, by reinforcing members.

3.2 A trough, to contain the test drum supported with its axis horizontal in a manner allowing rotation, capable of being filled with a slaking fluid, such as water, to a level 20 mm below the drum axis. The drum shall be mounted to allow 40 mm unobstructed clearance between the trough and the base of the mesh.

3.3 A motor drive, capable of rotating the drum at a speed of 20 rev/min, the speed to be held constant to within 5 percent for a period of 10 minutes.

3.4 An oven, capable of maintaining a temperature of 105 ± 5°C for a period of at least 12 hours.

3.5 A balance, capable of weighing the drum plus sample to an accuracy of 0·5 g.

4. TEST PROCEDURE

4.1 A representative sample comprising ten rock lumps should be selected, each weighing 40-60 g to give a total sample weight of 400-600 g. Lumps should be roughly spherical in shape and corners should be rounded off during preparation.

4.2 The sample shall be placed in clean drum and dried to constant weight at a temperature of 105 ± 5°C. The weight A of the drum plus sample shall be recorded. The sample should then immediately be used for testing purposes.

4.3 The lid shall be then placed, the drum mounted in the trough and coupled to the motor.

4.4 The trough shall be filled with slaking fluid, usually tap water at 20°C, to a level of 20 mm below the drum axis, and the drum rotated at 20 rev/min for a period of 10 minutes.

4.5 The drum shall be removed from the trough and the lid removed from the drum. The drum plus retained portion of sample shall be dried to constant weight at 105 ± 5°C. The weight B of the drum plus retained portion of the sample shall be recorded.

4.6 The test shall be repeated as in **4.4** and **4.5** for a further period of 10 minutes. The weight C of the drum plus retained portion of the sample shall be recorded.

4.7 The drum shall then be brushed clean and its weight D recorded.

5. CALCULATION

5.1 The slake-durability index (second cycle) is calculated as percentage ratio of final to initial dry sample weights as follows:

$$\text{Slake-durability Index percent } (I_{d2}) = \frac{C - D}{A - D} \times 100$$

6. REPORTING OF RESULTS

6.1 The report shall include the following information for each sample tested:

a) The slake-durability index (second cycle) to nearest 0·1 percent; and

b) The nature and temperature of the slaking fluid, usually tap water at 20°C.

6.1.1 If required additional information for details of fragments retained in the drum and material passing through the drum may also be given.

6.2 A tentative sub-division of the slake-durability scale may be used for classification as given in Table 1.

TABLE 1 TENTATIVE SUB-DIVISION OF SLAKE-DURABILITY SCALE

(*Clause* 6.2)

SLAKE-DURABILITY I_d PERCENT	CLASSIFICATION
0-25	Very low
Over 25-50	Low
Over 50-75	Medium
Over 75-90	High
Over 90-95	Very high
Over 95-100	Extremely high

6.3 The second cycle slake-durability index, calculated as in **5**, with tap water at 20°C, is proposed for use in rock classification. However, sample with second cycle indexes from 0 to 10 percent should be further characterized by their first cycle slake-durability indices as follows:

$$\text{Slake-durability Index (First-cycle) } I_{d1} \text{ percent} = \frac{B - D}{A - D} \times 100$$

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2